

AMENDMENT TO THE CLAIMS

Claims 1-26 (canceled)

Claim 27. (new) A method for storing data read from a primary memory device in a secondary memory device for read/write access by a processing means, the data in the primary memory device being organized as a plurality of data blocks each consisting of one or more data objects and the data objects being stored at one or more data regions of the secondary memory device, the secondary memory device comprising a plurality of data storage sections arranged in one or more data regions, the method comprising the steps of:

- 1) determining for each data object an access frequency indicating a number of accesses in a unit time interval; and
- 2) storing data objects whose access frequency falls in a predetermined access frequency range in data regions belonging to a same data storage section; wherein
 - a) the access frequencies of an access frequency range of an (i+1)-th data storage section are greater than the access frequencies of an access frequency range of an i-th data storage section; and
 - b) each access frequency range comprises an upper and a lower access frequency threshold value, wherein
 - i) a data object of the i-th data storage section is moved from the i-th to the (i+1)-th data storage section when the access frequency of said data object is greater than an upper access frequency threshold value of said i-th data storage section; or

- ii) a data object of the (i+1)-th data storage section is moved from the (i+1)-th to the i-th data storage section when the access frequency of said data object is smaller than a lower access frequency threshold value of said (i+1)-th data storage section.

Claim 28. (new) The method of claim 27, wherein said access frequency is stored together with said data object in said data region.

Claim 29. (new) The method of claim 27, wherein
said upper access frequency threshold value of the i-th data storage region is identical to said lower access frequency threshold value of the (i+1)-th data storage region.

Claim 30. (new) The method of claim 27, wherein
said upper access frequency threshold value of the i-th data storage region is larger than said lower access frequency threshold value of the (i+1)-th data storage region such that a hysteresis is used when moving said data objects between said i-th and said (i+1)-th data storage section.

Claim 31. (new) The method of claim 27, wherein
the determined access frequency indicates the number of read accesses, write accesses or read and write accesses to a data object.

Claim 32. (new) The method of claim 27, wherein
a physical reference is updated when said data object is moved from one data storage section to another data storage section.

Claim 33. (new) The method of claim 32, wherein
said physical reference is updated in an index structure.

Claim 34. (new) The method of claim 32, wherein
each data object comprises a first resident part containing attributes and a second movable file content part, and wherein a physical reference contained in one of the attributes is updated when said file content of said data object is moved.

Claim 35. (new) The method of claim 34, wherein
said first resident part is located on said primary memory device and said second movable file content part is located in said secondary memory device.

Claim 36. (new) A data processing device for processing data stored on a primary memory device, the data in said primary memory device being organized as a plurality of data blocks each consisting of one or more data objects, said processing device comprising:

a secondary memory device adapted to store the data objects at one or more data regions, said secondary memory device comprising a plurality of data storage sections arranged in one or more data regions; and

a processing means, comprising:

- (a) a read/write means adapted to read and write data objects from and to data regions of said secondary memory device; and
- (b) an access frequency determining means adapted to determine for each data object stored in one or more data regions of said secondary memory device an access frequency indicating the number of accesses performed by said read/write means in a unit time interval; wherein
 1. said read/write means is adapted for writing data objects whose determined access frequency falls in a predetermined access frequency range in the one or more data regions belonging to the same data storage section, and to update data objects according to their access frequency, wherein
 2. the access frequencies of an access frequency range of an (i+1)-th data storage section are greater than the access frequencies of an i-th data storage section; and
 3. each access frequency range is assigned an upper and a lower access frequency threshold value, wherein
 - a. said read/write means is adapted to move a data object of the i-th data storage section from the i-th to the (i+1)-th data storage section when the access frequency of said data object is greater than said upper access frequency threshold value; and
 - b. said read/write means is adapted to move a data object of the (i+1)-th data storage section from the (i+1)-th to the i-th data storage section

when the access frequency of said data object is smaller than said lower access frequency threshold value.

Claim 37. (new) The data processing device of claim 36, wherein in each data storage section each data region has assigned to it a predetermined access frequency of said access frequency range, and wherein said read/write means is adapted to move data objects within said data storage region to other data sections of the same data storage region in accordance with said determined access frequency.

Claim 38. (new) The data processing device of claim 37, wherein the determined access frequency indicates the number of read accesses, write accesses or read and write accesses to a data object.

Claim 39. (new) The data processing device of claim 37, further comprising: reference updating means for updating a physical reference when a data object is moved from one data storage section to another data storage section dependent on the access frequency.

Claim 40. (new) The data processing device of claim 36, wherein said read/write means is adapted to store said access frequency together with said data object in said data region.

Claim 41. (new) The data processing device of claim 36, wherein
said primary memory device is a disk memory;
said data stored on said disk memory is data of a database;
said data blocks are pages of said database;
said data objects each comprise a plurality of data bytes;
said secondary memory is a main memory of a data processor;
said first memory of said main memory is a page cache memory; and
said second memory of said main memory is a resident data work memory.

Claim 42. (new) The data processing device of claim 41, wherein
one part of the data of a single record of said database is stored in said page cache
memory and another part of the data is stored in said resident data work memory.

Claim 43. (new) The data processing device of claim 36, wherein
said upper access frequency threshold value of the i -th data storage region is identical to
said lower access frequency threshold value of the $(i+1)$ -th data storage region.

Claim 44. (new) The data processing device of claim 36, wherein
said upper access frequency threshold value of the i -th data storage region is larger than
said lower access frequency threshold value of the $(i+1)$ -th data storage region such that a
hysteresis is used when moving said data objects between said i -th and said $(i+1)$ -th data storage
section.

Claim 45. (new) A database system, comprising:

a primary memory device on which data of the database system is stored; and

a data processing device for processing data stored on the primary memory device, the data in said primary memory device being organized as a plurality of data blocks each consisting of one or more data objects, said processing device comprising:

a secondary memory device adapted to store the data objects at one or more data regions, said secondary memory device comprising a plurality of data storage sections arranged in one or more data regions; and

a processing means comprising:

a read/write means adapted to read and write data objects from and to the one or more data regions of said secondary memory device; and

an access frequency determining means adapted to determine for each data object stored in one or more data regions of said secondary memory device an access frequency indicating the number of accesses performed by said read/write means in a unit time interval; wherein

1. said read/write means is adapted for writing data objects whose determined access frequency falls in a predetermined access frequency range in the one or more data regions belonging to the same data storage section, and to update data objects according to their access frequency, wherein
2. the access frequencies of an access frequency range of an (i+1)-th data storage section are greater than the access frequencies of an i-th data storage section; and

3. each access frequency range is assigned an upper and a lower access frequency threshold value, wherein
 - a. said read/write means is adapted to move a data object of the i -th data storage section from the i -th to the $(i+1)$ -th data storage section when the access frequency of said data object is greater than said upper access frequency threshold value; and
 - b. said read/write means is adapted to move a data object of the $(i+1)$ -th data storage section from the $(i+1)$ -th to the i -th data storage section when the access frequency of said data object is smaller than said lower access frequency threshold value.

Claim 46. (new) The database system of claim 45, wherein
in each data storage section each data region has assigned to it a predetermined access frequency of said access frequency range, and wherein said read/write means is adapted to move data objects within said data storage region to other data sections of the same data storage region in accordance with said determined access frequency.

Claim 47. (new) The database system of claim 46, wherein
the determined access frequency indicates the number of read accesses, write accesses or read and write accesses to a data object.

Claim 48. (new) The database system of claim 46, further comprising:
reference updating means for updating a physical reference when a data object is moved
from one data storage section to another data storage section dependent on the access frequency.

Claim 49. (new) The database system of claim 45, wherein
said read/write means is adapted to store said access frequency together with said data
object in said data region.

Claim 50. (new) The database system of claim 49, wherein
one part of the data of a single record of said database is stored in said page cache
memory and another part of the data is stored in said resident data work memory.

Claim 51. (new) The database system of claim 45, wherein
said upper access frequency threshold value of the i -th data storage region is identical to
said lower access frequency threshold value of the $(i+1)$ -th data storage region.

Claim 52. (new) The database system of claim 45, wherein
said upper access frequency threshold value of the i -th data storage region is larger than
said lower access frequency threshold value of the $(i+1)$ -th data storage region such that a
hysteresis is used when moving said data objects between said i -th and said $(i+1)$ -th data storage
section.